



Emerging Issues with Montana's Underground Storage Tanks

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Leaking underground storage tanks (USTs) are a threat to ground water and, therefore, public health. This is why the Environmental Protection Agency (EPA) created regulations for state agencies to implement to protect ourselves, future generations, and the environment. Underground storage tank regulations have matured over the years to help mitigate threats to the integrity of USTs as we become more aware of the hazards of releases. Recently, two new issues have come to the forefront of underground storage tank management that owners and operators need to be aware of. Fuel incompatibilities with UST systems and microbial-induced corrosion are today's topics on protecting your underground storage tanks from their deleterious effects.

One constant in the underground storage tank world is that we can always count on fuel compositions evolving. Within a decade, biofuel blends such as biodiesel and ethanol-blended gasoline have taken a prominent seat in the marketplace. The sulfur content in highway diesel has also been greatly reduced. Ongoing research in fuels science promises greater fuel innovations for the future. With all these advancements in fuels, UST owners must ask themselves one question: "Is the fuel I'm putting in my tank compatible with my tank system?" Different fuels mean different chemical compositions and different chemical compositions mean different chemical properties. Here are some things to consider:

Fiberglass reinforced plastic tanks and piping older than 1984 may not be compatible with biofuels, and exposure to these fuels can lead to degradation of the material.

- System components such as pump heads may also be susceptible to alternative fuel types.
- Lining material used to line old steel tanks may not be compatible with the newer fuels.
- Unlined steel tanks are compatible with almost any fuel, however, keep in mind that ethanol fuels have solvent properties and can dislodge old tank repairs.
- Adhesives, glues, sealants and gaskets used around piping and other parts of a UST may not be compatible with certain fuels, including E10 (10% ethanol).

As an UST owner, it is by law, your responsibility to demonstrate system compatibilities with the fuel your tank is intended to store. If the fuel is not compatible with your UST system, the fuel cannot be stored in your tank.

With the introduction of biofuels, a new type of corrosion has entered the scene. This new type of corrosion is known as microbial-induced corrosion or MIC, and as the name implies, is caused by microbes. Given the right conditions, microbial-induced corrosion can be very aggressive and certainly a threat to an underground storage tank system. This type of corrosion is different from galvanic corrosion in that it occurs internally, rather than from the tank exterior, and it all starts with water entering the tank. As we know, water in any tank is not good, but water in ethanol-blended fuel tanks is a death wish for steel tanks and metal components in a tank system. Water can be introduced into a tank by leaking gaskets, water in delivery trucks, spill bucket drains, or other methods of entry. The ethanol in the fuel has a very high affinity for water and will absorb water until it reaches its saturation point. When this saturation point occurs, the water separates from the fuel and forms a layer. Like humans, microbes must have water to survive and once this water layer is produced (as little as 0.25 inches), specific microbes, most notably *Acetobacter* (genus) bacteria, which are normally present in the environment, settle at this water-ethanol interface. *Acetobacter* bacteria and other microbes that use ethanol as a food source, begin to feed on the ethanol, and in the process, produce acetic acid as a byproduct. This acid easily disperses into the ullage space of the tank and with a constant cycle of wetting and drying of the tank's metallic surfaces, this aggressive corrosion begins.

Microbial-induced corrosion can also occur on metals components present in tank top sumps. If vapor is present due to vapor leaks and if there is enough humidity in the sump, these ethanol-loving microbes, once again, can proliferate and produce their acid byproduct. Some of the reports from other states with high humidity have been astounding, with rapid corrosion of newly installed pumping systems occurring within months.

Microbial-induced corrosion has also been found in Ultra-low sulfur diesel (ULSD). Ethanol is not a component of ULSD, but shared fuel trucks that deliver both ethanol fuels and diesel fuels can contain residual ethanol if the truck is not cleaned between loads. Ethanol vapor can also make its way into a diesel tank if the tank shares manifolded ventilation systems with a gasoline tank. Again, when water enters the system, the process begins.

So, what can an underground storage tank owner or operator do to protect their tanks from these threats? If it hasn't become apparent already, proactive maintenance is vital. Know the challenges that relate to your UST systems. Determine if your system is compatible with the fuel you intend to store. If the fuel is not compatible with your tank system, you cannot store that product in your tank. The Association of State and

Territorial Solid Waste Management Officials (ASTSWMO) has a very useful publication, "*Compatibility of UST Systems with Biofuels*". This report contains a checklist, as well as recommendations to aid the owner in making compatibility decisions (go to www.ASTSWMO.org for the publication). The EPA also has two online resources to help owners determine system compatibility with alternate fuels greater than E10 and B20 (20% biodiesel). Go to <http://www.epa.gov/oust/altfuels/biofuels.htm> for the publications.

Water management in your UST system is more important now than ever. Ensure that entry points into your tanks are tight by replacing gaskets, fittings, and plugs regularly. Remove liquid from spill buckets and sumps promptly. It is best not to drain liquid back into the tank, as water may be present. The lower concentration ethanol fuels phase-separate quicker than fuels with higher concentrations of ethanol. Once phase separation has occurred, it is irreversible, so early water detection is essential. Check for water in your tank frequently. Automatic tank gauges can detect water in your tank system. At least two ATGs on the market have the capability of detecting water in the fuel before it separates out. You can also stick your tanks manually for water with the appropriate water-finding paste. Once water has been detected in your tank, have the water removed immediately, as phase separation is irreversible. The Steel Tank Institute has a helpful, free publication, "*Keeping Water out of Your Storage System*". Go to www.steeltank.com to download the publication.

Finally, be aware that UST systems have a finite life-span. Tank life depends on a number of factors including quality of installation, construction activities at the site, fluctuating groundwater conditions, change in product storage, galvanic and microbial-induced corrosion, to name a few. Montana considers steel tanks older than ten years, and fiberglass reinforced plastic tanks older than twenty years, at risk. Needless to say, replacing your tank systems before failure is less costly than environmental remediation.

In today's changing world, staying current with issues affecting underground storage tank life and integrity is paramount. System fuel incompatibilities and microbial-induced corrosion are real issues surrounding underground storage tanks. Taking simple steps, such as determining fuel compatibility and managing water in your tank systems can mean the difference between success and UST failure.